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of authorities; for the element of personal knowledge is entirely wanting. Nor has the compilation the value it might have had if authorities had been quoted. Although the book is apparently by a New-Englander, he omits the limestones of Smithfield, R.I., and the serpentines of Lynnfield, Mass.,—both interesting, though, as yet, little-used stones. Any personal knowledge of the subject would have supplied a host of such facts, which are not to be found in books, though well known to geologists. The same absence of personal knowledge leads to such misleading statements as that the fossils around Prague are identical with those of the same age in Scandinavia, Russia, Great Britain, and North America. While the book is padded with thirty-eight pages on classification of fossils, nothing is given to the arts of quarrying or of dressing stones,—most important and most relevant matters.

The chromolithographic plates are fairly well done: they fail to give the peculiar effect of depth or translucency, which is beyond this art, but which is the greatest charm of the finest decorative stones.

The style is not altogether bad, though it is frequently inverted; and the author often gets into the subject very much as John Phoenix 'backed the transit' into the plane of the meridian. Now and then it is strikingly epigrammatic, as in the following phrase: 'One of the caprices of nature is to anticipate the works of art.'

It is a pity that so much faithful labor should have been given to this work. The printing of the book, and the index, are very satisfactory. Despite its defects, the book will have a certain value to those interested in the subject; for, as a compilation, it is, in its way, remarkable.

A PRIMER OF VISIBLE SPEECH.

Visible-speech reader for the nursery and primary school. By ALEX. MELVILLE BELL, F.E.I.S., etc. Cambridge, King, 1883. 4 + 52 p. 16°.

THE science of phonetics made, perhaps, its greatest advance through Bell's Visible speech, though it has by no means remained stationary since that book appeared. It is this system which this primer seeks to bring into practical use in teaching, and its alphabet is a great improvement over that which we now use. It cannot be said, however, that the phonetic analysis on which it is based has received in all respects the approval of phoneticians. With some changes, the vowel system has now

won wide acceptance, but the analysis of consonants has met with serious objections; for instance, for such sounds as *f*, *th*, *s*, *sh*, in English. A discussion of the system itself would necessitate reference to recent work on phonetics, especially to Sweet's paper on Sound notation in the Transactions of the philological society for 1880-81, and to Sievers's Grundzüge der phonetik, and such a discussion would hardly be in place here. One may wish, however, that some of Sweet's changes of the Visible-speech alphabet could have been adopted. Still, the imperfections of the system might never attract a child's notice, and he would probably accept unquestioningly the signs given for *f* and *th*, without understanding why they were made to resemble the sign for *l*. For the scientific study of living languages, and of the phenomena of linguistic change, some such phonetic system as Visible speech, we may hope, will be agreed upon, at least provisionally, whether it is found of practical value in teaching children to read or not. The test of practice must show whether this ingenious alphabet will do better than other phonetic primers the work of teaching a child to read ordinary printed books. The primer is divided into three parts,—first, pictured words, containing pictures of a few common objects, with their names and some phrases; next, sentences in rhythmical form; and lastly, a vocabulary of common words arranged according to the initial sound, beginning with labial consonants, and ending with vowels. All this is printed only in Visible-speech letters. These three parts are preceded by some directions to the teacher; and at the end a key is added for the teacher's use, containing the usual forms in Roman type of all the words in the primer. Exclusive of the key, the whole contains thirty-five pages. At the beginning of the key are given a few 'notes,' which speak of the syllabic *l* and *n*, as in *castle*, *listen*, and of the glides, that is, the vowel vanishes, or final diphthongal elements in such words as *hear* (the sound represented by *r*), *day*, *go*. It must surprise an American student of phonetics to see that American pronunciation is credited by Mr. Bell with pure long vowels in the last two of these words, instead of with diphthongs, especially if his own experience and observation with foreign languages have shown him how hard it is for most Americans to learn the pure long sounds of *e* and *o* as pronounced on the continent of Europe. Possibly the American vanishing vowel in these cases is less prominent than in England, and it may be that some Americans do pronounce

simple long vowels in such cases. In this primer these two glides are not used with *ā* and *ō*. To call the *r* glide, as in *hear*, a very soft *r* is misleading, as most of us in the eastern United States pronounce absolutely no *r* at all in such words.¹ Here, too, what is said of American pronunciation is inexact; for surely we all have an *r* glide in words like *hearing*, while an English reader of Mr. Bell's words would suppose that Americans pronounce *hear*

¹ See Whitney, The elements of English pronunciation, in his Oriental and linguistic studies, second series.

as he does, but *hearing* like *he-ring*. The American rule for the *r* glide may be thus stated for some, perhaps most of us: when the *r* glide is present at the end of a word, it is retained before any ending of derivation or inflection, the consonant *r* being pronounced in addition after the glide if the ending begins with a pronounced vowel. Thus the glide is heard in *boor*, *boorish*, *beer*, *beery*, *soar*, *soaring*, *store*, *storing*, *stored*; but there is no *r* glide in *Mary*, *story*, *fury*. Cases like these last seem to have been excluded from the book.

WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

CHEMISTRY.

(General, physical, and inorganic.)

New explosive.—S. H. Hinde proposes a new explosive mixture composed of 64 parts of nitro-glycerine, 12 ammonium citrate, 0.25 ethyl palmitate, 0.25 calcium carbonate, 23 coal, 0.50 sodium carbonate. — (*Chem. techn. rept.*, 1883, 153.) C. E. M.

[196]

Compressed cartridges.—H. Güttler makes cartridges of compressed blasting-powder, which are bound together by dextrine. For this purpose he uses a hard burned charcoal (brown-red), which he claims has the formula $C_8H_4O_2$. The mixture of charcoal, sulphur, and nitre are incorporated with the solution of dextrine, corned in grains of one to two millimetres; and after drying they are pressed into perforated cylinders. These cylinders are then dried and shelled. The reaction due to explosion is represented, when India nitre is used, by $C_8H_4O_2 + 8KNO_3 + 4S = 8CO_2 + 2H_2O + 8N + 2K_2SO_4 + 2K_2S$. — (*Chem. techn. rept.*, 1883, 154.) C. E. M.

[197]

Fulminating compound.—B. G. and F. L. Benedict have invented a mixture for use in primers, in place of fulminating mercury, consisting of 2 parts amorphous phosphorus, 8 of minium, and 2 of potassium chlorate. The oxides of mercury or manganese may be used in place of the minium. — (*Chem. techn. rept.*, 1883, 153.) C. E. M.

[198]

AGRICULTURE.

Soluble and insoluble phosphates.—In experiments on potatoes, Swanwick and Prevost obtained a larger yield on plots manured with superphosphate than on those manured with the same phosphate simply ground. A slight increase in the percentage of starch was observed in the potatoes manured with superphosphate. — (*Bied. centr.-blatt.*, xii. 250; *Trans. highl. agric. soc.*, 1882.) H. P. A.

[199]

Value of artificial butter.—There are, according to Ad. Mayer, three principal points to be regarded in judging of the worth of an article of diet; viz., harmlessness, taste, and physiological utility. That artificial butter is harmful can hardly be seriously

claimed; while, as regards its taste, the very magnitude of the industry shows that the imitation is very successful. The physiological utility of artificial butter depends essentially on its digestibility; and on this point Mayer has experimented, using as subjects a man, and a boy nine years old. But slight differences were observed between natural and artificial butter; but the former was digested a trifle better. When the artificial butter was used in preparing potatoes, it proved to be almost uneatable; and the author suggests that this fact may prove of use in detecting the presence of the former. — (*Landw. vers.-stat.*, xxix. 215.) H. P. A.

[200]

Butt and tip kernels of corn.—The vegetation of the butt, central, and tip kernels of corn in the field has corroborated the results already published as gained in the greenhouse. The figures of vegetations stand as below:—

Planted.	Butt kernels.	Central kernels.	Tip kernels.
1 A 1, May 16	June 1. June 4. 446 533	June 1. June 4. 551 581	June 1. June 4. 564 600
1 A 2, "	478 534	515 564	564 583
1 A 3, "	497 558	490 570	500 549
1 A 4, "	428 496	463 560	519 587
1 A 5, "	362 467	456 526	428 526
Total vegetated	2211 2588	2485 2801	2575 2845
Total planted	3420 3420	3420 3420	3420 3420
Per cent vegetated	64 75	72 82	75 83

— (*N. Y. agric. exp. stat.*, bull. xlvii.) H. P. A. [201]

Chemistry of asparagin.—B. Schulze finds that asparagin is not decomposed to any notable extent by heating with water, even under a pressure of three to four atmospheres, and in the presence of acid plant-juices. Consequently, when fodders containing asparagin, of which there are many, are cooked, this substance is unaltered; and, since its nutritive value has been established, the knowledge of this fact is of some importance. When heated with alkalis, asparagin yields asparaginic acid and ammonia, while a portion of the acid is further acted on, and malic acid is formed. — (*Landw. vers.-stat.*, xxix. 233.) H. P. A.

[202]